What is claimed is:

1   1.   A method for segmenting a compressed bitstream, the method comprising:

2   analyzing bit rate characteristics for the compressed bitstream; and

3   parsing the bitstream into a video segment, wherein the video segment represents

4   a portion of the compressed bitstream capable of being processed.

1   2.   The method of claim 1 wherein the video segment comprises a group of coded

2   pictures.

1   3.   The method of claim 1 wherein the video segment comprises one of a coded

2   frame and a video slice.

1   4.   The method of claim 3 wherein the compressed bitstream has an MPEG format.

1   5.   The method of claim 1 wherein the parsing further comprises transrating the video

2   segment into a plurality of transrated video segments.

1   6.   The method of claim 1 further comprising formatting the video segment into a

2   video block.

1   7.   The method of claim 6 wherein the video block includes a plurality of video

2   segments, wherein each of the plurality of video segments has a different bit rate.

1   8.   The method of claim 6 wherein the video block includes a plurality of video

2   segments, wherein the plurality of video segments are adapted to be switched at video

3   segment boundaries.

1   9.   The method of claim 6 wherein the video block includes a video block header.

1   10.   The method of claim 1 further comprising formatting the video segment into

2   transport packet format.

1   11.   The method of claim 10 wherein the formatting further includes partitioning the

2   video segment into a plurality of transport packets.

1   12.   The method of claim 10 wherein at least one of the plurality of transport packets

2   includes stuffing bits.

1   13.   A method for transrating a compressed bitstream into a plurality of output

2   bitstreams having a bit rate, the method comprising:

3   extracting a packet payload from the compressed bitstream;

4   decoding the packet payload into at least one video frame;

5   storing the at least one video frame in at least one frame buffer;

6   providing data in the at least one frame buffer to a plurality of encoder outputs

7   associated with the plurality of output bitstreams, each of the plurality of

8   encoder outputs having a quantization scale factor; and

9   adjusting the quantization scale factor for each of the plurality of encoder outputs

10   to change the bit rate of the plurality of output bitstreams.

1   14.   The method of claim 13 wherein the at least one video frame includes a DCT

2   coefficient associated with a partial decode of the packet payload.

1   15.   The method of claim 13 wherein the compressed bitstream is segmented into

2   video segment processing units.

1   16.   The method of claim 13 wherein at least one of the plurality of output bitstreams

2   is segmented into video segment processing units.

1   17.   The method of claim 14 wherein the video segment includes one of a group of

2   coded pictures, a coded frame, and a video slice.

1 18. The method of claim 15 further comprising formatting the plurality of output

2 bitstreams into a video block.

1 19. The method of claim 18 wherein the video block comprises at least one video

2 segment and a video block header.

1 20. The method of claim 19 wherein the video block header comprises at least one of

2 packet schedule information, compression statistics, and a video segment offset.

1 21. The method of claim 13 wherein the quantization scale factor is adjusted to

2 reduce the bit rate by at least one of a fixed percentage and a fixed amount.

1 22. A method for multiplexing a plurality of program bitstreams, the method

2 comprising:

3   providing a plurality of video blocks for each of the plurality of program

4   · bitstreams;

5   determining a bit budget for an inspection period;

6   parsing a video block header for each of the plurality of program bitstreams to

7   determine video segment information;

8   selecting a video segment from each of the plurality of video blocks to meet the

9   bit budget; and

10   providing the selected video segments to an output buffer coupled to a

11   communications channel.

1 23. The method of claim 22 wherein the plurality of video blocks comprise a plurality

2 of video segments, each of the plurality of video segments being encoded at a different

3 bit rate.

1   24.   The method of claim 22 wherein the selecting further comprises scheduling the

2   video segments to fill the communications channel capacity.

1   25.   The method of claim 22 wherein the selecting further comprises modeling a

2   decoder buffer to avoid at least one of underflow and overflow.

1   26.   The method of claim 22 wherein the video segment comprises a local stream

2   segment for content insertion.

1   27.   A system for segmenting a compressed bitstream, the system comprising:

2   an analyzer module configured to analyze bit rate characteristics for the

3   compressed bitstream; and

4   a separator module configured to parse the bitstream into a video segment,

5   wherein the video segment represents a portion of the compressed

6   bitstream capable of being processed.

1   28.   The system of claim 27 wherein the video segment comprises a group of coded

2   pictures.

1   29.   The system of claim 27 wherein the video segment comprises one of a coded

2   frame and a video slice.

1   30.   The system of claim 27 further comprising a transprocessor configured to

2   transrate the video segment into a plurality of transrated video segments.

1   31.   The system of claim 27 further comprising a formatter module configured to

2   format the video segment into a video block.

1   32.   The system of claim 31 wherein the video block includes a plurality of video

2   segments, wherein each of the plurality of video segments has a different bit rate.

1   33.   The system of claim 31 wherein the video block includes a plurality of video

2   segments, wherein the plurality of video segments are adapted to be switched at video

3   segment boundaries.

1   34.   The system of claim 31 wherein the video block includes a video block header.

1   35.   The system of claim 27 further comprising formatting the video segment into

2   transport packet format.

1   36.   The system of claim 35 wherein the formatting further includes partitioning the

2   video segment into a plurality of transport packets.

1   37.   The system of claim 36 wherein at least one of the plurality of transport packets

2   includes stuffing bits.

1   38.   A system for transrating a compressed bitstream into a plurality of output

2   bitstreams having a bit rate, the system comprising:

3   an extractor module for extracting a packet payload from the compressed

4   bitstream;

5   a decoder module for decoding the packet payload;

6   a plurality encoder outputs associated with the plurality of output bitstreams, each

7   of the plurality of encoder outputs having a quantization scale factor; and

8   a quantization module for adjusting the quantization scale factor for each of the

9   plurality of encoder outputs to change the bit rate of the plurality of output

10   bitstreams.

1   39.   The system of claim 38 wherein the compressed bitstream is segmented into video

2   segment processing units.

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1 40. The system of claim 39 wherein the video segment includes one of a group of

2 coded pictures, a coded frame, and a video slice.

1 41. The system of claim 39 further comprising formatting the plurality of output

2 bitstreams into a video block.

1 42. The system of claim 41 wherein the video block comprises at least one video

2 segment and a video block header.

1 43. The system of claim 42 wherein the video block header comprises at least one of

2 packet schedule information, compression statistics, and a video segment offset.

1 44. The system of claim 38 wherein the quantization scale factor is adjusted to reduce

2 bit rate by at least one of a fixed percentage and a fixed amount.

1 45. A bit rate switch for multiplexing a plurality of program bitstreams, each of the

2 plurality of bitstreams having a plurality of video blocks, the switch comprising:

3   means for determining a bit budget for an inspection period;

4   means for parsing a video block header for each of the plurality of program

5   bitstreams to determine video segment information;

6   means for selecting a video segment from each of the plurality of video blocks to

7   meet the bit budget; and

8   means for providing the selected video segments to an output buffer coupled to a

9   communications channel.

1 46. The switch of claim 45 wherein the plurality of video blocks comprise a plurality

2 of video segments, each of the plurality of video segments being encoded at a different

3 bit rate.

1   47.   The switch of claim 45 further comprising a scheduler for selecting the video

2   segments to fill the communications channel capacity.

1   48.   The switch of claim 45 further comprising a decoder buffer model for modeling a

2   decoder buffer behavior to avoid at least one of underflow and overflow.

1   49.   The switch of claim 45 wherein the video segment comprises a local stream

2   segment for content insertion.